Phase	Туре
☐ Initial Site Investigation ☐ Corrective Action Feasibility Investigation ☐ Corrective Action Plan ☐ Corrective Action Summary Report ⑤ Operations and Monitoring Report	☐ Work Scope Technical Report ☐ PCF Reimbursement Request ☐ General Correspondence

Summary Report Haviland's Gulf Station Brattleboro, Vermont SMS #90-0560

for

Mr. Lee Merrill Barrows Coal Company 35 Main Street Brattleboro, VT 05301

by

ENVIRONMENTAL COMPLIANCE SERVICES, Inc.
157 Old Guilford Road, #6
Brattleboro, VT 05301
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December 29, 1997

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1.0 Introduction

The following is a summary report of findings of a soil gas and groundwater monitoring program initiated to evaluate the benefits gained from continuing soil vapor extraction at Haviland's Gulf station located on High Street in Brattleboro, VT (See Site Locus Map in Appendix A). The report has been prepared by *ENVIRONMENTAL COMPLIANCE SERVICES*, *Inc.* (ECS) of Brattleboro, VT on behalf of Barrows Coal Company of Brattleboro.

Following its shut down in July 1996, due to persistently low levels of volatile organic compounds (VOCs) the catalytic oxidation incinerator and blower were removed from the site for use at a state funded remedial system located in Fairhaven, VT. Dedicated soil gas survey (SGS) points installed along the eastern border of the site were screened for VOCs to determine if a build-up of gasoline vapors was occurring. A program was initiated to assess the potential for vapor build-up though a combination of SGS monitoring and cycling of the soil vapor extraction (SVE) system. Since the catox unit and blower were removed from the site, granular activated carbon (GAC) and a portable electric 1 horsepower blower were used to activate the SVE points. VOCs were monitored at the three SVE and five SGS points using an organic vapor meter (OVM). Groundwater samples were obtained from the six groundwater monitoring wells located at the site and at downgradient properties was for VOC analysis by EPA Method 8020 plus MTBE.

Personnel from ERD Environmental, Inc. of Brattleboro, VT performed the above noted site investigations. In August of 1997, ERD closed its Brattleboro office and former ERD employees now staff the Brattleboro office of ECS. Lee Merrill of Barrows Coal Company contracted ECS to provide environmental services at the Haviland's Gulf site.

2.0 Summary of Investigations

2.1 VOC Levels in Soil Gas

In order to evaluate the SVE system at the Haviland's Gulf site for closure, ERD personnel monitored VOC levels during periods of system cycling. As part of this monitoring, a one-hour test run was conducted on August 19, 1996. VOC levels increased with time and ERD recommended retesting the SVE system for longer periods to determine if higher VOC levels accumulate. Using a one horsepower blower and a 55 gallon GAC canister, the system was run for 69 hours from October 14 through 17, 1996. Air flow velocity averaged 1160 feet per minute (25 cfm) as measured through a 2 inch diameter PVC effluent pipe. Vacuum levels ranged from 1.0 to 4.5 inches of water. During the first 24 hours, low, but gradually increasing influent levels of VOCs were measured. The test run continued until peak VOC readings were reached (24 ppm at EP-3). After almost 3 days, the VOC levels dropped to 0.0 to 3.8 ppm. Vacuum and air velocity readings remained relatively constant. No VOCs were detected in the effluent of the GAC canister during the test period. The test results are summarized in Table 1.

Table 1. VOC, Vacuum Readings, and Flow Rates Measured During the October, 1996 Test Run

	1-1-2-1-1-1-1	voc.	(ppm)		Vacinum Readings (Inches of water)				
	Ex	traction Po	oint	GAC	Extraction Point				
	1	2	3	Influent	1	2	3		
10/14/96 12:20	0.6	0.6	0.8	0.8	NM	NM	NM		
10/14/96 16:45	12.6	0.0	5.6	4.7	1.0	3.5	3.0		
10/15/96 8:45	8.3	0.0	5.6	15.4	4.5	3.5	3.5		
10/15/96 13:45	16.0	0.9	24.2	11.6	3.0	3.5	4.0		
10/15/96 16:30	13.8	1.4	22.3	12.6	4.0	4.0	4.0		
10/16/96 10:30	11.0	2.5	7.6	3.1	4.0	4.0	4.0		
10/16/96 16:45	9.0	0.2	20.1	9.2	3.5	3.5	3.5		
10/17/96 08:45	0.7	0.0	3.8	1.0	4.0	3.5	3.5		

Using VOC levels and flow rates measured during the test period, the degree of soil gas contamination was evaluated by determining the theoretical volume of gasoline collected during the test period. The calculations are presented in Table 2.

Table 2. VOC levels and Theoretical Recovery Rates of Gasoline During the October 1996 Test Run

Date	Time	VOC lotal	VOC ^{BTEX} ppm (x 8.5%)	mg/m³	BTEX lbs/day, (9.08 x 10 ⁻⁵), (A)	(cfm)	Gasoline gallons/day (A x cm x 0.65)
10/14/96	12:15	0.8	0.068	0.26	2.40 X 10 ⁻⁵	25	0.0004
·	16:45	4.7	0.40	1.55	1.41 x 10 ⁴	25	0.0023
10/15/96	8:45	15.4	1.31	5.09	4.62 x 10 ⁻⁴	25	0.0075
	13:45	11.6	0.986	3.84	3.48 x 10 ⁻⁴	25	0.0057
	16:30	12.6	1.07	4.17	3.78 x 10 ⁻⁴	25	0.0061
10/16/96	10:30	3.1	0.26	1.01	9.18 x 10 ⁻⁵	25	0.0015
	16:45	9.2	0.78	3.04	2.76 x 10 ⁴	25	0.0045
10/17/96	08:45	1.0	0.085	0.33	3.00 x 10 ⁻⁵	25	0.0005

The total theoretical volume of gasoline recovered during the test run was 0.011 gallons. This equated to an average daily rate of approximately 0.004 gallons/day or 1.3 gallons/year.

The VOC levels at the five SGS points were screened in concert with the SVE points using the OVM. The results are presented in Table 3.

Table 3. VOCs Detected at SGS Points During the October 1996 Test Run.

Date	Time		SGS Point #2	11.000000000000000000000000000000000000	SGS Point #4	SGS Point #5
10/14/96	12:15	0.0	0.8	0.0	0.8	0.3
	16:45	0.0	0.0	0.0	38	0.0
10/15/96	8:45	0.2	0.0	0.0	21	0.0
	13:45	0.4	0.0	0.0	158	0.0
	16:30	0.0	0.0	0.0	116	0.0
10/16/96	10:30	0.0	0.0	0.0	0.0	0.0
	16:45	0.0	0.0	0.0	36	0.0
10/17/96	08:45	0.0	0.0	0.0	43	0.0

The highest level of VOCs detected came from SGS point #4 (158 ppm). This point is located immediately northeast of the site building. A site map showing the layout of the SGS points is provided in Appendix B. SVE extraction point #3, located closest to the eastern property line of the Haviland's Gulf Station, also had the highest level of VOCs detected during the test run. A delay of approximately 24 hours was observed before the maximum VOC levels were reached for both the SVE and SGS points. At the start of the test run the VOC levels in each SVE point were less than 1.0 ppm. As the test proceeded, VOC levels increased at SVE-1 and -3 and SGS-4.

ERD concluded that residual gasoline contamination remained in the site soils, particularly in the vicinity of SGS point #4 and SVE extraction point #3. ERD concluded from this test run that continued operation of the SVE system at Haviland's Gulf did not justify the limited remedial benefits gained, and the level of petroleum contaminants remaining at the site should be adequately remediated through passive degradation via natural volatilization and biodegradation. ERD presented this information in letters to the VT DEC.

Since the test run was performed in mid October (cooler temperatures), ERD recommended monthly monitoring of the SGS points through the summer of 1997, with full rounds of groundwater sampling to be conducted in April and June, 1997. If no significant increases in VOC levels were detected at the SGS points over the summer period and no changes were detected in the trend of groundwater contaminant levels, the site would be recommended for a Site Management Activity Completed designation.

2.2 SGS Point Monitoring

Results from the screening of VOCs at the five on-site soil gas survey (SGS) points are summarized in Table 4. ERD personnel used a Thermo Environmental Instruments Model 580B Organic Vapor Meter (OVM) field calibrated to a 250 ppm Isobutylene span gas to monitor the VOC levels.

SGS Point SGS Point SGS Point SGS Point SGS Point #1 #2 #3 #4 #5 Date 0.0 0.0 0.0 0.0 0.0 7/9/96 0.0 2,0 0.0 0.0 7/17/96 0.0 2:0 0.0 0.0 0.0 7/25/96 0.00.0 0.9 0.0 7/30/96 0.00.0 0.0 0.0 0.0 0.00.0 8/8/96 0.0 8/16/96 0.0 0.0 0.0 0.0 1.2 0.9 0.0 8/30/96 1.9 0.00.0 0.0 0.0 0.0 9/4/96 NΑ 0.0 0.0 0.0 0.0 0.0 9/12/96 0.0 0.0 1.6 0.0 9/20/96 0.0 2.5 0.0 0.0 0.0 9/27/96 0.0 0.0 0.0 0.0 0.0 10/8/96 0.0 0.0 0.0 10/25/96 0.0 0.0 0.0 0.0 0.0 0.0 0.1 1.2 11/1/96 0.0 0.0 0.0 0.00.0 11/8/96 0.0 0.0 0.0 0.0 0.0 2/26/97 4/7/97 0.0 0.0 0.0 0.0 0.0 0.0 0.0 4/25/97 0.0 0.0 0.0 0.0 0.6 5/9/97 0.0 0.0 3.0 0.0 6/11/97 0.0 0.0 0.0 0.0 0.0 0.0 0.0 6/25/97 0.0 VOC readings in ppmv NA = not accessible

Table 4. VOCs Detected at SGS Points

2.3 Groundwater Sampling and Analysis

The last quarterly report submitted to the VT DEC by ERD was dated December 16, 1996 and addressed groundwater sampling conducted on October 3, 1996. On April 7, 1997 and June 25, 1997, ERD personnel collected groundwater samples from the site monitoring wells. During each sampling event groundwater was gauged using a Solinst water level meter accurate to 0.01 foot and samples were collected with standard plastic disposable bailers after adequately purging the well of water by removing three well volumes. The samples, a trip blank, and duplicate sample from MW-3 were refrigerated and sent, via courier, to Alpha Analytical Laboratories in Westborough, Massachusetts for analysis by EPA Method 8020 plus MTBE. Groundwater potentiometric data and analytical results are summarized in Tables 5 and 6.

Total BTEX levels for previous sampling events are provided for comparison.

Table 5. Groundwater Potentiometric Data

	Groundwater	Monitoring Wells								
Date	Data (in feet)	MW-1	MW-2	MW-3	MW-4	MW-5	MW-8			
Top of	Top of PVC	100.00	93.66	96.68	94.17	90.97	93.99			
4/7/97	Depth to Groundwater	9.33	dry	5.30	5.94	5.26	13.22			
	Groundwater Elevation	90.67	dry	91.38	88.23	85.71	80.77			
6/25/97	Depth to Groundwater	dry	dry	6.40	8.91	6.25	dry			
	Groundwater Elevation	dry	dry	90.28	85.26	84.72	dry			

A Groundwater Potentiometric Map for the April 1997 sampling event is presented in Appendix C. The groundwater flow direction within the investigation area was shown to be in an east-southeasterly direction, consistent with previous observations.

Table 6. Results of Laboratory Analysis of Groundwater Samples

Date	Compounds		VT PGQES (ug/L)					
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-8	(ug/L)
5/18/95	Total BTEX	dry	dry	ND	9,980 (9,790)	13,310	dry	-
11/9/95	Total BTEX	ND	dry	ND	2,400 (2,126)	16,590	1,840	-
2/6/96	Total BTEX	ND	dry	ND	3,655	17,020 (14,580)	173	- -
6/11/96	Total BTEX	ND	dry	ND	3,820	10,130	dry	-
10/3/96	Total BTEX	dry	dry	ND (ND)	7,660	11,860	dry	<u>-</u>
4/7/97	Benzene	ND	dry	ND (ND)	56	1,000	280	5.0
	Toluene	ND	dry	ND (ND)	11	260	9.3	1,000
	Ethylbenzene	ND	dry	ND (ND)	85	2,100	30	700
	Xylenes	ND	dry	ND (ND)	330	11,000	190	10,000
	Total BTEX	ND	dry	ND (ND)	482	14,360	509.3	-

Date	Compounds		VT PGQES (ug/L)					
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-8	(ug/L)
6/25/97	Benzene	dry	dry	ND (ND)	480	ND	dry	5.0
	Toluene	dry	dry	ND (ND)	150	180	dry	1,000
	Ethylbenzene	dry	dry	ND (ND)	1,200	1,600	dry	700
	Xylenes	dry	dry	ND (ND)	4,200	5,500	dry	10,000
	Naphthalene	dry	dry	ND (ND)	220	270	dry	20
	Total BTEX	dry	dry	ND (ND)	6,030	7,280	dry	-

results reported as ug/L or parts per billion (ppb)

ND = not detected

duplicate sample results are presented in parentheses

PGQES = Primary Groundwater Quality Enforcement Standards (revised November 15, 1997)

No contaminants were identified at levels above the method detection limits in samples collected from the monitoring wells (MW-1, -2, and -3) located on the Haviland's Gulf Station property. Samples collected from the downgradient monitoring wells (MW-4, 5 and 8), contained levels of Benzene, Ethylbenzene, Xylenes, and Naphthalene in excess of the VT Primary Groundwater Quality Enforcement Standards. Complete laboratory data sheets and the chain-of-custody records are presented in Appendix D.

Comparison of the 1997 groundwater sampling data to past events indicates that the degree of contamination in areas located downgradient of the Haviland's Gulf Station has remained relatively constant since the start of testing in May of 1995, with Total BTEX levels ranging from 7,280-17,020 ug/l at MW-5 and 173-1,840 ug/l at MW-8. Variations in contaminant levels are most likely due to fluctuations in groundwater table elevations.

3.0 Risk Evaluation

3.1 Exposure Pathways

The subject area is serviced by the municipal drinking water and sewer systems. No active public or private drinking water wells that would be impacted by the release of gasoline at the site are known to exist within the subject area.

The drinking water line located in High Street has been shown to serve as a preferential migration pathway for the gasoline released at the site. The release of gasoline at Haviland's Gulf was first detected during the installation of the existing water line. The line was installed using appropriate gaskets and piping to prevent infiltration of gasoline contaminants. Monitoring wells MW-4 and MW-5 are located within the water line trench. Gasoline contaminant levels continue to exceed VT PGQES at these monitoring wells and at monitoring

well MW-8 located south of MW-5 outside of the utility trench.

Depth to groundwater at the site ranges from 5 feet to 13 feet depending upon well location and time of year. During seasonal dry periods many of the wells are dry, indicative of the shallow depth to bedrock (10-15 feet below the ground surface) in this area of Brattleboro. While no contamination has been detected in the monitoring wells located at Haviland's Gulf, groundwater contamination continues to be detected at levels above the VT PGQES in the downgradient monitoring wells (particularly in MW-5, where Benzene levels continue to be as high as 200 times greater than the VT PGQES). Based on the shallow depth to groundwater, the persistent level of groundwater contamination that remains in the vicinity of the downgradient monitoring wells, the presence of a preferential migration pathway and residences located along the migration route, the potential exists for the migration of gasoline vapors through soil gas into overlying residential structures.

3.2 Sensitive Human Receptors

Several residences are located immediately downgradient and east of Haviland's Gulf. The Green Street Elementary School is located approximately 300 feet southeast of the site. Groundwater flow patterns at the subject property suggest that the contaminant plume is not migrating towards this sensitive receptor but rather passes north of it.

3.3 Sensitive Environmental Receptors

No streams/rivers, ponds/lakes or wetlands that would impacted by the gasoline release that occurred at the site are located in the immediate vicinity of the subject area. No surface discharge of groundwater emanating from the site has been identified in the subject area.

4.0 Conclusions

ENVIRONMENTAL COMPLIANCE SERVICES, INC. (ECS) provides conclusions based on remedial and assessment actions conducted by ERD Environmental, Inc. (ERD) at Haviland's Gulf Station located on High Street in Brattleboro, VT.

- ECS concurs with ERD's conclusion that continued operation of the SVE system at the Haviland's Gulf site does not justify the limited remedial benefits gained from this treatment. The increase in VOCs observed during prolonged operation of the SVE system using a 1 horsepower blower appears to be the result of the accumulation of gasoline vapors in the soil gas; however, the source of the contamination is no longer located at Haviland's Gulf Station but rather may be from vapors located downgradient of the station.
- 2) Further monitoring of the soil gas survey (SGS) points and groundwater sampling through the summer of 1997 did not reveal additional information to warrant continuation of the SVE system at the Haviland's Gulf Station site.

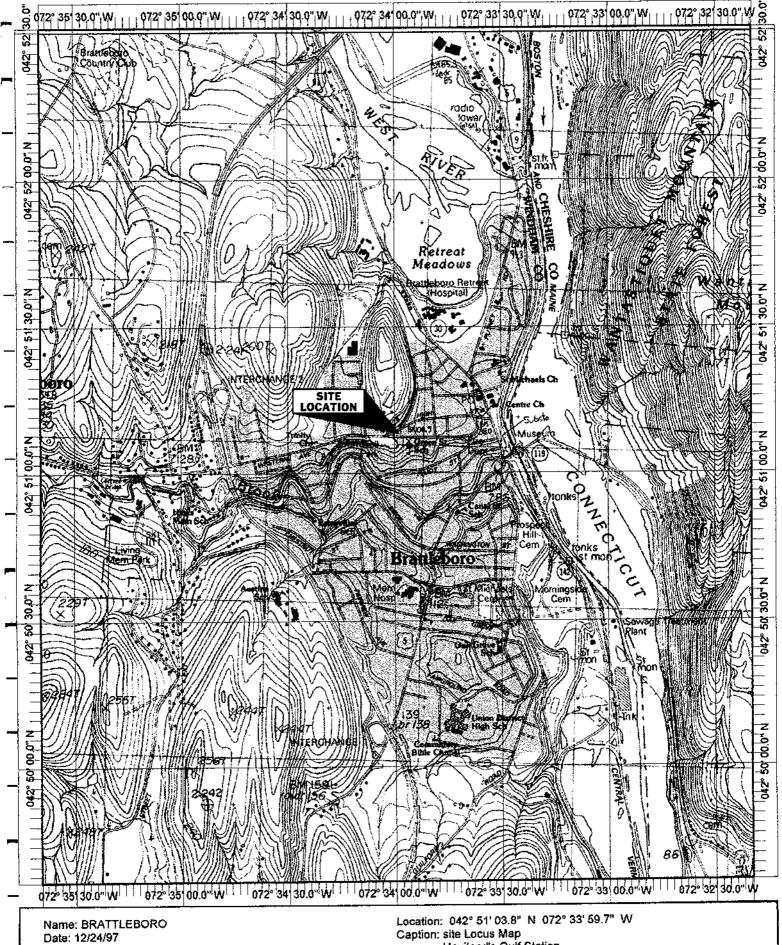
- Results of analysis of groundwater samples obtained from the downgradient monitoring wells indicate the continued presence of gasoline related compounds in excess of the VT Primary Groundwater Quality Enforcement Standards (PGQES) in the vicinity of several residences.
- A limited evaluation of risk posed by the gasoline release at Haviland's Gulf Station indicates that the extent of contamination has been successfully remediated at the station but that residual contamination exists downgradient to the east of the station, beyond the influence of the SVE system.
- The extent and degree of gasoline contaminated groundwater has not been fully delineated in areas downgradient of Haviland's Gulf Station. The concentrations of Benzene and Naphthalene are an order of magnitude greater than the PGQES and an exposure pathway appears to exist via soil gas migration into residential structures at several properties along the migration route.

5.0 Recommendations

- Since no significant increases in VOC levels were detected at the SGS points during the summer of 1997, and no changes were detected in the trend of groundwater contaminant levels in the monitoring wells located at Haviland's Gulf Station, ECS is of the opinion that the SVE system has served its purpose in remediating gasoline contaminated soils in the vicinity of the release area and further operation of the system is not warranted.
- While ECS does not object to recommending the gasoline station property for a Site Management Activity Completed designation, this designation should not be extended to the downgradient properties due to the potential risk posed by gasoline contaminants remaining in soil and groundwater within and presumably beneath several residences located immediately downgradient of Haviland's Gulf Station.
- groundwater monitoring at MW-4, -5 and -8, and further delineating the extent of this contamination through the installation of additional groundwater monitoring wells closer to the Haviland's Gulf Station property and further downgradient of MW-5 and MW-8. A soil gas survey should be conducted adjacent to the residences to screen soil gas for VOCs using a photoionization detector. Proposed monitoring well and soil gas survey point locations are shown on the site layout map in Appendix B. Groundwater samples should be collected during seasonal wet periods when groundwater elevations are highest. Samples including a trip blank and duplicate should be analyzed for VOCs via EPA Method 8020 plus MTBE, and updated Groundwater Potentiometric and Isoconcentration Maps should be generated. A report with conclusions and recommendations should be prepared summarizing this information. Based on these additional investigations, this portion of the Haviland's Gulf Station "site" can be properly evaluated for closure actions.

Appendix A

Site Locus Map

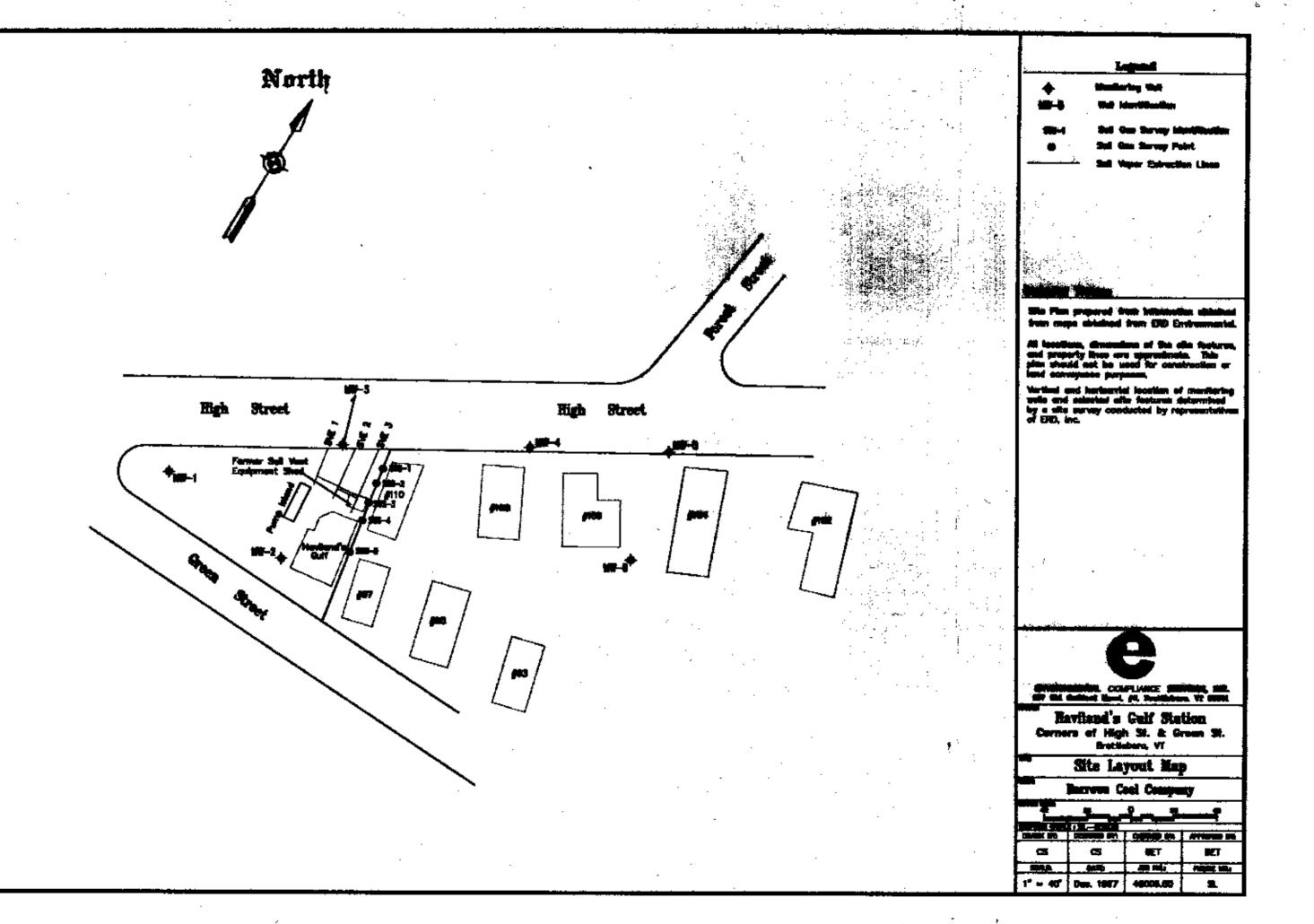


Scale: 1 inch equals 2000 feet

Haviland's Gulf Station Brattleboro, VT

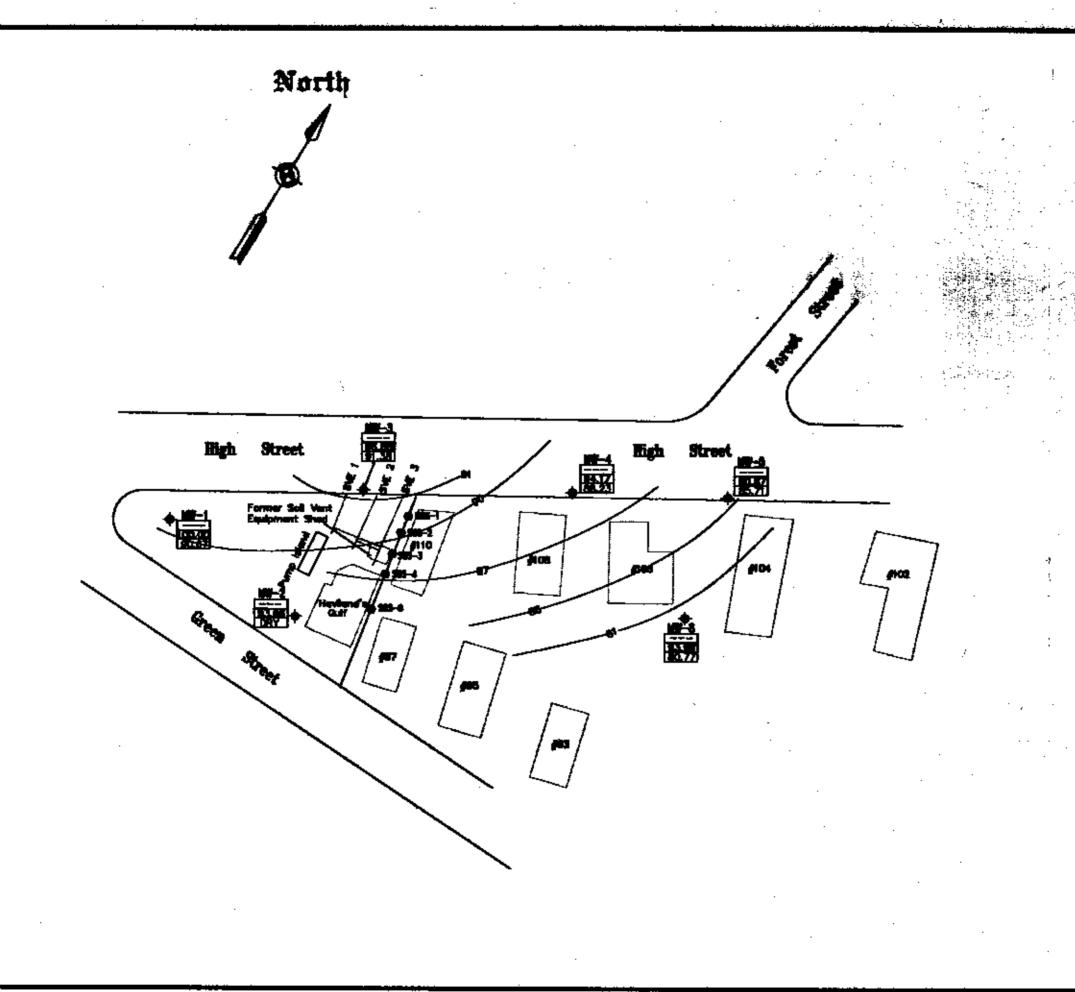
Appendix B

Site Layout Map



Appendix C

Groundwater Potentiometric Surface Map for April 7, 1997



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- 1

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PVC Strutte Groundwise

Site Plan property from historistics obtained from prope obtained from ERD Englangmental.

All feathers, dimensions of the site feathers and property flow are appreciately. This plan should not be used for construction or and conveyence purposes.

Vertical and horizontal leastles of mentioning with and selected afte features determined by a after survey conducted by representatives of ENO, inc.

Grandester destifies are board on an examined binchmark of 102.00 fast, leasted at MW-1.

ments made on 4/7/87. Plustuations in the lovel of groundwater may come due to factors set accounted for at the time the meccurements were made.

Drumdoster contenes and fine directions attached homogenous, isotropic souther conditions, and horizontal flow.

Oreandanter contours are interpolated to date points and informal in other grace.



STATEMENT CONTINUE SERVER, SEL.

Haviland's Gulf Station Corners of High St. & Green St. Brattiebore, YT

mitvalor Potentiomotric Higg 4/7/F

Berrown Coel Company

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			THE REAL PROPERTY.
1" - 40"	Des. 1887	40000.00	2



Analytical Data Sheets and Chain of Custody Records

ALPHA ANALYTICAL LABORATORIES

RECEIVED ADD 18 1997

Eight Walkup Drive Westborough, Massachusetts 01581-1019 (508) 898-9220

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

CERTIFICATE OF ANALYSIS

Client: ERD Environmental, Inc.

Laboratory Job Number: L9702596

Address: 205 Main Street

Invoice Number: 3708

PO Box 1760

Brattleboro, VT 05302

Date Received: 09-APR-97

Attn:

Bruce Tease

Date Reported: 16-APR-97

Project Number: 202-01

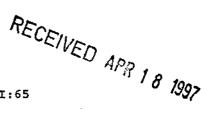
Delivery Method: Alpha

Site: Hauland's

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L9702596-01	MW1-4797-202	
L9702596-02	MW3-4797-202	
L9702596-03	MW4-4797-202	
L9702596-04	MW5-4797-202	
L9702596-05	MW8-4797-202	
L9702596-06	MW02-4797-202	
L9702596-07	MW01-4797-202	

Authorized by:

Scott McLean - Laboratory Director



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9702596-01

MW1-4797-202

Date Collected: 07-APR-97 Date Received: 09-APR-97

Sample Matrix:

WATER

Date Reported: 16-APR-97

Condition of Sample:

Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	res Analysis	II
Aromatic Volatile Organics		_		1	8020	10-Apr	DE
Benzene	ND	ug/l	1.0				
Toluene	ИD	ug/l	1.0				
Ethylbenzene	ND	ug/l	1.0				
Xylenes	ND	ug/l	1.0		/		
1,2-Dichlorobenzene	ND	ug/1	1.0				
1,3-Dichlorobenzene	ND	ug/1	1.0				
1,4-Dichlorobenzene	ND	ug/1	1.0				
Chlorobenzene	ND	ug/l	1.0				
Methyl tert butyl ether	ND	ug/l	1.0				
Naphthalene	ND	ug/l	1.0				



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9702596-02

MW3-4797-202

Date Collected: 07-APR-97 Date Received: 09-APR-97

Sample Matrix:

WATER

Date Reported : 16-APR-97

Condition of Sample: Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATES PREP ANALYSIS	ĮI
Aromatic Volatile Organics				1	8020	11-Apr	<u> </u>
Benzene	ND	ug/l	1.0				
Toluene	ND	ug/l	1.0				
Ethylbenzene	ND	ug/l	1.0				
Xylenes	ND	ug/l	1.0		<i>?</i>		
1,2-Dichlorobenzene	ND	ug/1	1.0				
1,3-Dichlorobenzene	ND	ug/1	1.0				
1,4-Dichlorobenzene	ND	ug/l	1.0				
Chlorobenzene	ND	ug/l	1.0				
Methyl tert butyl ether	ND	ug/l	1.0				
Naphthalene	ND	ug/l	1.0				



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9702596-03

MW4-4797-202

Date Collected: 07-APR-97 Date Received: 09-APR-97

Sample Matrix:

WATER

Date Reported: 16-APR-97

Condition of Sample: Satisfactory

Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATES PREP ANALYSIS	ID
Aromatic Volatile Organics				1 8020	10-Apr	DB
Benzene	56.	ug/l	1.0			
Toluene	11.	ug/l	1.0			
Ethylbenzene	85.	ug/1	1.0			
Xylenes	330	ug/l	1.0	,		
1,2-Dichlorobenzene	ND	ug/l	1.0			
1,3-Dichlorobenzene	ND	ug/l	1.0			
1,4-Dichlorobenzene	ND	ug/l	1.0			
Chlorobenzene	ND	ug/l	1.0			
Methyl tert butyl ether	ND	ug/l	1.0			
Naphthalene	ND	ug/l	1.0			



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9702596-04

MW5-4797-202

Date Collected: 07-APR-97 Date Received: 09-APR-97

Sample Matrix:

WATER

Date Reported: 16-APR-97

Condition of Sample:

Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATES PREP ANALYSIS	II
Aromatic Volatile Organics			12-2	1 8020	11-Apr	DE
Benzene	1000	ug/l	10.			
Toluene	260	ug/1	10.			
Ethylbenzene	2100	ug/l	10.			
Xylenes	11000	ug/l	10.	!		
1,2-Dichlorobenzene	ND	ug/l	10.			
1,3-Dichlorobenzene	ND	ug/l	10.			
1,4-Dichlorobenzene	ND	ug/l	10.			
Chlorobenzene	ND	ug/l	10.			
Methyl tert butyl ether	17.	ug/l	10.			
Naphthalene	ND	ug/l	10.			

Comments: Complete list of References and Glossary of Terms found in Addendum I



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9702596-05

MW8-4797-202

Date Collected: 07-APR-97 Date Received: 09-APR-97

Date Reported: 16-APR-97

Sample Matrix:

WATER

Condition of Sample: Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATES PREP ANALYSIS	IE
			- sessorese (* 11.0 6.2 a 1812/310/31000	1	8020	10-Apr	DE
Benzene	280	ug/l	1.0				
Toluene	9.3	ug/l	1.0				
Ethylbenzene	30.	ug/1	1.0				
Xylenes	190	ug/l	1.0		1		
1,2-Dichlorobenzene	ND	ug/l	1.0				
1,3-Dichlorobenzene	ND	ug/l	1.0				
1,4-Dichlorobenzene	ND	ug/l	1.0				
Chlorobenzene	ND	ug/l	1.0				
Methyl tert butyl ether	ND	ug/l	1.0				
Naphthalene	ND	ug/1	1.0				



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9702596-06

MW02-4797-202

Date Collected: 07-APR-97 Date Received: 09-APR-97

Sample Matrix:

WATER

Date Reported: 16-APR-97

Condition of Sample:

Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATES PREP ANALYSIS	ID
Aromatic Volatile Organics				1	8020	10-Apr	DB
Benzene	ND	ug/l	1.0				
Toluene	ND	ug/l	1.0				
Ethylbenzene	ND	ug/l	1.0				
Xylenes	ND	ug/1	1.0		<i>}</i>		
1,2-Dichlorobenzene	ND	ug/l	1.0				
1,3-Dichlorobenzene	ND	ug/l	1.0				
1,4-Dichlorobenzene	ND	ug/l	1.0				
Chlorobenzene	ND	ug/l	1.0				
Methyl tert butyl ether	ND	ug/l	1.0				
Naphthalene	ND	ug/l	1.0				



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9702596-07

MW01-4797-202

Date Collected: 18-MAR-97 Date Received: 09-APR-97

Sample Matrix:

WATER

Date Reported : 16-APR-97

Condition of Sample: Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATES I PREP ANALYSIS	D
Aromatic Volatile Organics				1 8020	10-Apr D)B
Benzene	ND	ug/l	1.0			
Toluene	ND	ug/l	1.0			
Ethylbenzene	ND	ug/l	1.0			
Xylenes	ND	ug/l	1.0	1		
1,2-Dichlorobenzene	ND	ug/l	1.0			
1,3-Dichlorobenzene	ND	ug/l	1.0			
1,4-Dichlorobenzene	ND	ug/l	1.0			
Chlorobenzene	ND	ug/l	1.0			
Methyl tert butyl ether	ND	ug/l	1.0			
Naphthalene	ND	ug/l	1.0			

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH MS/MSD ANALYSIS

RECEIVED APR 18 1997

Laboratory Job Number: L9702596

Parameter	MS %	MSD %	RPD	
Volatile Organics Spike	Recovery by GC	Ms/MsD for	sample(s) 01-07	
1,1-Dichloroethene	112	104	7	•
Trichloroethene	115	101	13	·
Chlorobenzene	101	118	16	
Benzene	95	102	7	*.
П =1	96	116	19	•
Toluene				

ALPHA ANALYTICAL LABORATORIES ADDENDUM I

RECEIVED APR 18 1997

REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. 1986.

GLOSSARY OF TERMS AND SYMBOLS

REF Reference number in which test method may be found.

METHOD Method number by which analysis was performed.

ID Initials of the analyst.

LIMITATION OF LIABILITIES

- Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.
- We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

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ALPHA ANALYTICAL LABORATORIES

RECEIVED JUL 0 7 1997

Eight Walkup Drive Westborough, Massachusetts 01581-1019 (508) 898-9220

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

CERTIFICATE OF ANALYSIS

Client: ERD Environmental, Inc.

Laboratory Job Number: L9704983

Address: 205 Main Street

Invoice Number: 6120

PO Box 1760

Brattleboro, VT 05302

Date Received: 26-JUN-97

Attn: Bruce Tease

Date Reported: 03-JUL-97

Project Number: 202

Delivery Method: Alpha

Havilands Gulf Site:

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE	LOCATION
L9704983-01	MW-3-62597-202		
L9704983-02	MW-4-62597-202		
L9704983-03	MW-5-62597-202		
L9704983-04	MW-02-62597-202		
1.9704983-05	MW-01-62597-202		

Authorized by: James R. Kotto

James R. Roth, PhD - Laboratory Manager

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9704983-01

MW-3-62597-202

Date Collected: 25-JUN-97 Date Received: 26-JUN-97

Sample Matrix:

WATER

Date Reported: 03-JUL-97

Condition of Sample: Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATES PREP ANALYSIS	ID
Aromatic Volatile Organics				1	8020	27-Jun	DB
Benzene	ND	ug/l	1.0				
Toluene	ND	ug/l	1.0				
Ethylbenzene	ND	ug/1	1.0				
Xylenes	ND	ug/l	1.0		1		
1,2-Dichlorobenzene	MD	ug/l	1.0				
1,3-Dichlorobenzene	ND	ug/l	1.0				
1,4-Dichlorobenzene	ND	ug/l	1.0				
Chlorobenzene	ND	ug/1.	1.0				
Methyl tert butyl ether	ND	ug/l	1.0				
Naphthalene	ND	ug/l	1.0				

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9704983-02

MW-4-62597-202

Date Collected: 25-JUN-97 Date Received: 26-JUN-97

Sample Matrix:

WATER

Date Reported: 03-JUL-97

Condition of Sample:

Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF METH	OD DATES PREP ANALYSIS) 11
Aromatic Volatile Organics				1 8020	27-Jun	, DI
Benzene	480	ug/l	10.			
Toluene	150	ug/l	10.			
Ethylbenzene	1200	ug/l	10.			
Xylenes	4200	ug/l	10.			
1,2-Dichlorobenzene	ND	ug/1	10.			
1,3-Dichlorobenzene	ND	ug/l	10.			
1,4-Dichlorobenzene	ND	ug/l	10.			
Chlorobenzene	ND	ug/l	10.			
Methyl tert butyl ether	ND	ug/l	10.			
Naphthalene	220	ug/l	10.			

RECEIVED JUL 0 7 1997

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9704983-03

MW-5-62597-202

Date Collected: 25-JUN-97
Date Received: 26-JUN-97

Sample Matrix:

WATER

Date Reported: 03-JUL-97

Condition of Sample:

Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATES I PREP ANALYSIS
Aromatic Volatile Organics			-	1 8020	27-Jun D
Benzene	ND	ug/l	10.		
Toluene	180	ug/l	10.		
Ethylbenzene	1600	ug/1.	10.	•	
Xylenes	5500	ug/l	10.	1	
1,2-Dichlorobenzene	ND	ug/l	10.		
1,3-Dichlorobenzene	ND	ug/l	10.		
1,4-Dichlorobenzene	ND	ug/l	10.		
Chlorobenzene	ND	ug/l	10.		
Methyl tert butyl ether	ND	ug/l	10.		
Naphthalene	270	ug/l	10.		



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9704983-04

MW-02-62597-202

Date Collected: 25-JUN-97 Date Received: 26-JUN-97

Sample Matrix:

WATER

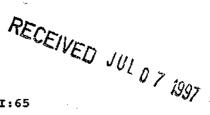
Date Reported: 03-JUL-97

Condition of Sample: Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATES PREP ANALYSIS	ID
Aromatic Volatile Organics				1	8020	27-ปันก	i DB
Benzene	ND	ug/l	1.0				
Toluene	ND	ug/1	1.0				
Ethylbenzene	ND	ug/l	1.0				
Xylenes	ND	ug/l	1.0		,		
1,2-Dichlorobenzene	ND	ug/l	1.0				
1,3-Dichlorobenzene	ND	ug/l	1.0				
1,4-Dichlorobenzene	ND	ug/l	1.0				
Chlorobenzene	ND	ug/l	1.0				
Methyl tert butyl ether	ND	ug/l	1.0				
Naphthalene	ND	ug/l	1.0				



MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L9704983-05

MW-01-62597-202

Date Collected: 25-JUN-97 Date Received: 26-JUN-97

Sample Matrix:

WATER

Date Reported: 03-JUL-97

Condition of Sample: Satisfactory

Field Prep:

None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATES PREP ANALYSIS	II
Aromatic Volatile Organics				1	8020	27-Jur	DE
Benzene	ND	ug/l	1.0				
Toluene	ND	ug/l	1.0				
Ethylbenzene	ND	ug/l	1.0				
Xylenes	ND	ug/l	1.0		<i>!</i>		
1,2-Dichlorobenzene	ND	ug/l	1.0				
1,3-Dichlorobenzene	ND	ug/l	1.0				
1,4-Dichlorobenzene	ND	ug/l	1.0				
Chlorobenzene	ND	ug/1	1.0				
Methyl tert butyl ether	ND	ug/l	1.0				
Naphthalene	ND	ug/l	1.0				

ALPHA ANALYTICAL LABORATORIES QUALITY ASSURANCE BATCH MS/MSD ANALYSIS

RECEIVED JULD 7 1997

Laboratory Job Number: L9704983

Parameter	MS %	MSD %	RPD	
Volatile Organics Spike	Recovery by GC	MS/MSD for	sample(s) 01-05	
1,1-Dichloroethene	105	87	19	•
Trichloroethene	99	92	7	•
Chlorobenzene	111	110	1 .	
Benzene	93	94	1	
Toluene	93	100	7	
	93	94	1	

ALPHA ANALYTICAL LABORATORIES ADDENDUM I

REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. 1986.

GLOSSARY OF TERMS AND SYMBOLS

REF Reference number in which test method may be found.

METHOD Method number by which analysis was performed.

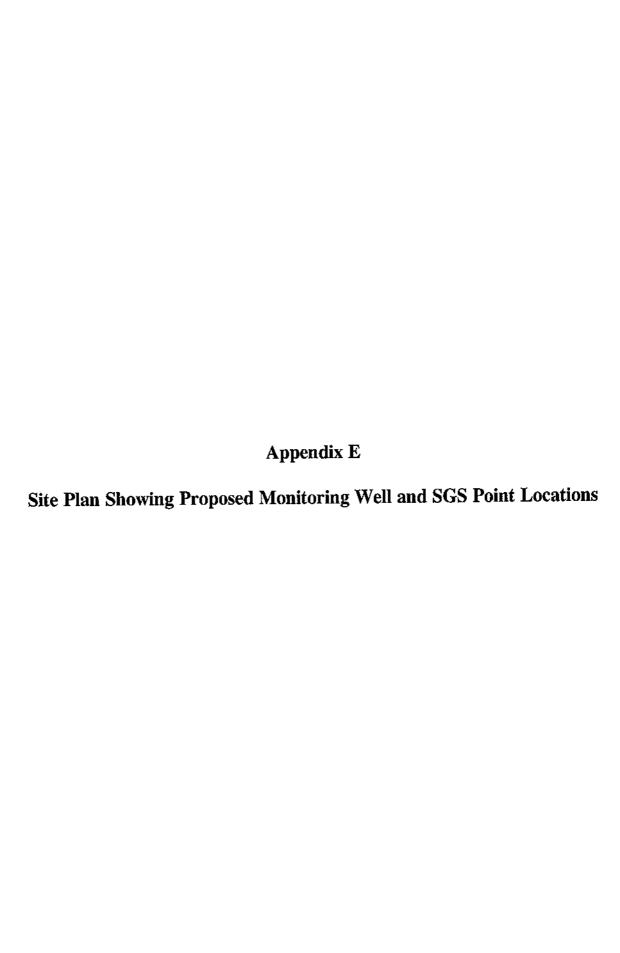
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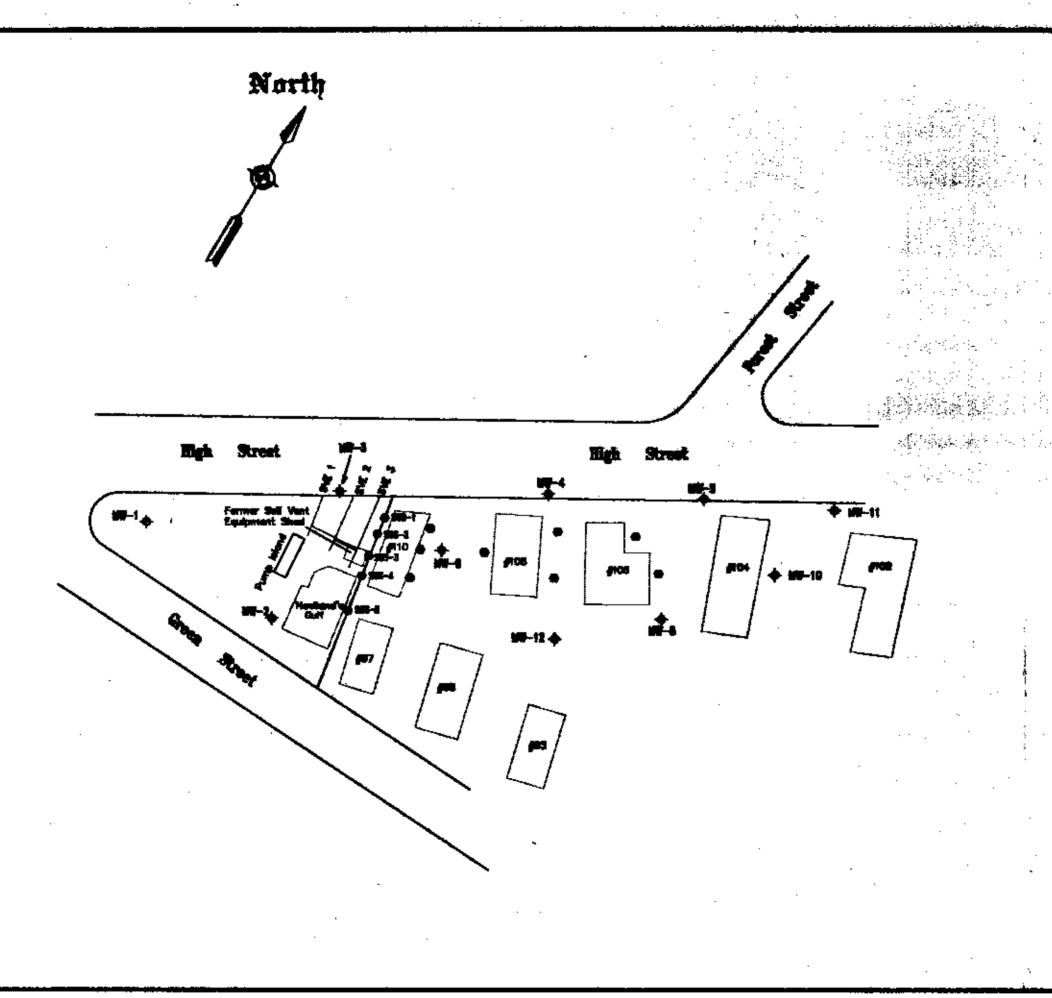
LIMITATION OF LIABILITIES

Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

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Burrows Coal Company

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